

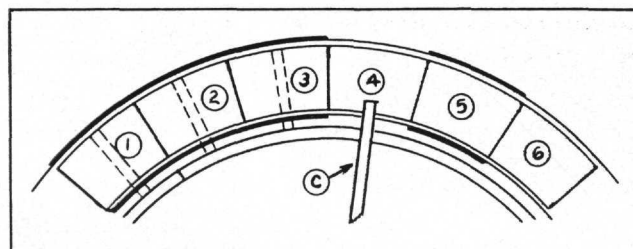
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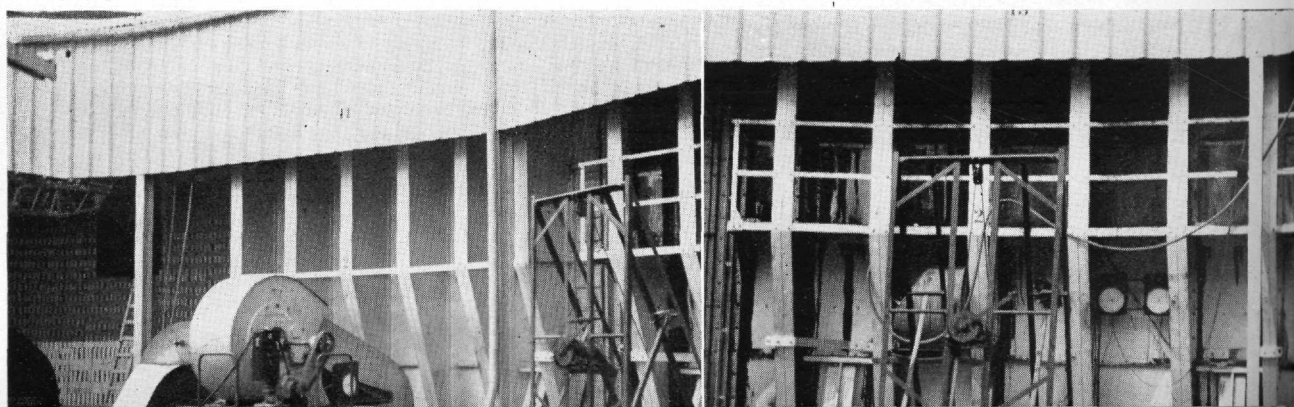


A general view of the "circle system". The clay is conveyed from the preparation house on the left to the machine room which is in the center of the circular kiln shed.



A plan view of the "circle".

Left: The preheating fan and the heat resisting shield.
Right: A direct view of the firing section in place.



A BRICK PLANT ON A TURNTABLE

By DONALD POSTLEWAITE

THE saying, "You can't teach an old dog new tricks", comes in for another upset as indicated by the latest development in brick manufacture. This newest method is a novel setup of a brick manufacturing plant mounted on a turntable resembling a merry-go-round.

The original development of this method, known as the "Circle System" of brick manufacture is credited to John R. Clark of the Washington Brick Company. Thomas Somerville III, president of this company, urged the adoption of the system by the directors of the company after recognizing the unusual features and advantages contained therein. T. W. Garve of Columbus, Ohio, was the consulting engineer in charge of clay testing, designing, construction, and initial operation of the plant. Mr. Garve received a degree in Mechanical Engineering in Germany and a Ceramic Engineering degree at Ohio State.

The plant is located at Muirkirk, Maryland, adjacent to the highway and the B&O railroad between Washington and Baltimore, and presents an interesting and unique spectacle to passing travelers.

The plant is favorably located for available transportation facilities and accessibility to important markets and also is situated in an excellent clay field. When the clay deposit was opened up and thoroughly prospected, it was found to contain several very fine clays all of which could be used to produce brick of different colors. Originally, the plans contemplated only the manufacture of common brick, but the discovery of the new clays

caused the scheme to be changed to the manufacture of face brick which sell at a higher price.

The clay veins are from thirty to sixty feet or more in depth and can easily be removed with the gasoline power shovel which is used to mine the clay. The shovel excavates the clay and loads it into a three cubic yard, wooden, side dump cart which is hauled by a gasoline locomotive into the clay preparation plant, located in a building adjacent to the "Circle".

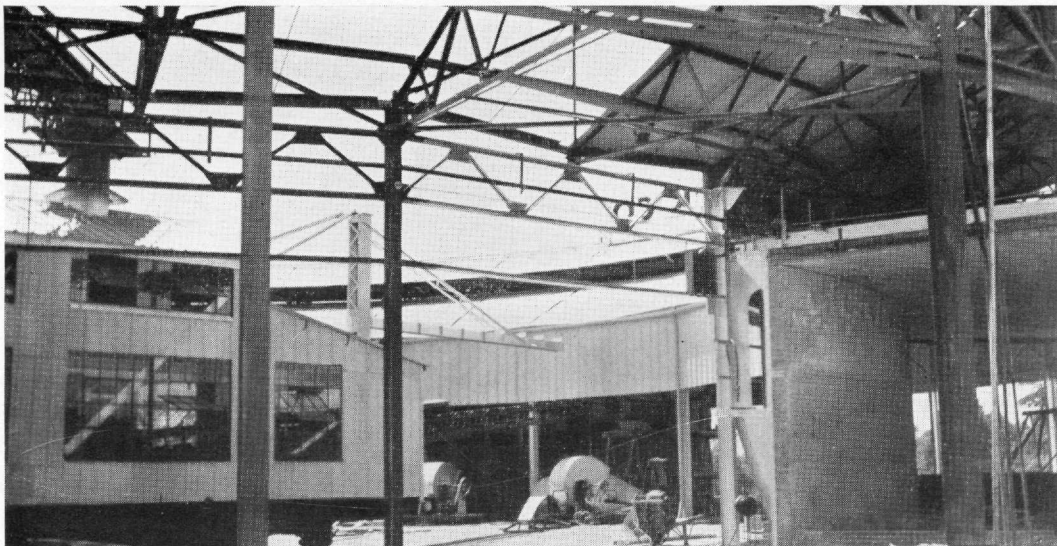
The clay is dropped into a granulator which feeds the clay to a set of conical rolls for the elimination of stones. The clay is passed through another set of grinding rolls and is then moved onto a belt conveyor which delivers the clay to the brick machine room.

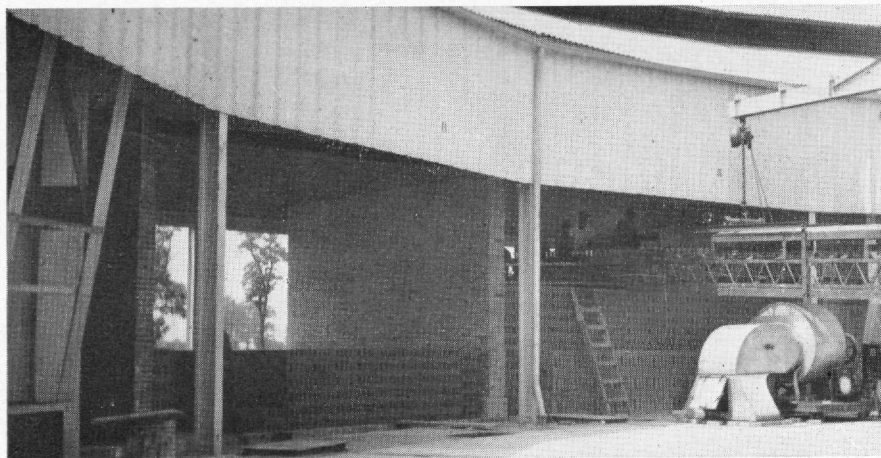
All the preliminary moving, handling, and preparation of the clays is similar to methods used in many ceramic plants with variations used only to suit local conditions. Thus, the new development is really concerned with the stages of manufacture following the preparation of the clay.

An inclined belt conveyor connects the clay preparation room with the machine room. The conveyor, which is about 200 feet long, is inclined until it passes over the top of the circular kilns and then runs horizontal until it reaches the machine room. At this point it is connected to a stationary pipe into which it deposits its load. This pipe is the center of the machine room which pivots about an axis through this pipe.

The machine room is mounted upon a strong platform equipped with four large wheels running on a circular

At the extreme right can be seen the inside of the kiln ring. The entire molding room revolves on a circular track.





The end of the off-bearing conveyor is shown taking the brick from the machine room to the kilns for setting.

track. Each wheel must support approximately eight tons which necessitated strong materials and construction. The end of the conveyor frame is supported by a ring of ball bearing castors arranged around the pipe hopper and rolling on a circular steel plate attached to the steel support of the machine room, thus permitting a stationary pipe hopper when the machine room is revolved.

The clay is fed into a combination brick machine which mixes the clay with a definite amount of water and then extrudes the plastic material through a die in the form of a continuous clay bar. The machine is equipped with a de-airing apparatus, but so far it has not been found necessary to de-air the clay. The clay bar is cut into brick of the desired size by an electric driven wire cutting machine which cuts fifteen brick in one cycle. The brick are then delivered to the off-bearing belt which transports them directly to the kilns.

The kiln placers take the brick from the off-bearing belt and set them in the kiln. As soon as one kiln section has been filled with brick to a height of eleven courses, a drying hood is pulled over the brick and connected to the heat supply in order that the brick may be dried. After drying, another eleven courses are set in the section and dried, followed by a third setting of eleven courses of brick, and when they are dry, the section is ready for firing. The conveyor can be tilted so as to deliver the brick to the setters at whatever height they may be working, thus eliminating considerable labor for tossing brick that is normally used in a brick plant. After a section has been set with eleven courses of brick, the conveyor is drawn into the machine room, and then the machine room and belt are revolved one hundred and eighty degrees to deliver bricks to an opposite section of the kiln.

The Circle itself is composed of sixteen sections of a permanent kiln floor and duct system arranged in circle. The foundations of the kilns are insulated with diatomaceous earth, mined locally. The kiln bottom in each section consists of a series of eight inch parallel floor flues with a connecting flue at right angles leading

therefrom to a circular main flue located underground and inside the kiln circle. Damper slots are provided on each side of the kiln flue to control the direction and flow of the combustion gases and hot air. The end walls of each section are also of permanent construction.

The drying, preheating, firing, and cooling processes are carried on under movable hoods which travel on a circular two rail track. The roof and side walls of the hoods in combination with the permanent side walls and floor of the kiln section form a complete kiln chamber. The suspended roof and side walls of the hood are built of a light weight insulating refractory which are attached to the steel frame of the hood by steel tie rods. These hood units are mounted on wheels with ball bearings so as to permit them to be moved along the circular kiln track. The drying hood moves independently of the preheating, firing, and cooling units which are moved as one unit. A top seal and two side seals (consisting of a pillar of insulating refractories attached to a steel "I" beam) must be displaced sufficiently to obtain clearance over the side walls before the units can be moved. Heat loss between the side of the hood and the floor is prevented by the use of a sand seal similar to that used in tunnel kilns. This consists of a steel apron riding in a trough of sand. The preheating unit has a vent in the roof for permitting the combustion gases to escape from the kiln. These gases then pass through a continuous moneter in the top of the circular kiln building.

The firing and preheating hoods are built of steel and lined with a light weight insulating refractory material with wall thickness of nine and four and one half inches respectively.

The wave is fired by oil burners along each side of the firing hood, seven burners on the outside and five on the inside. The oil burners are of the low pressure air atomization type and connect to a feed line which also circles the plant. Peepholes are provided in the kiln walls to enable the firemen to observe the progress of the firing and make needed adjustments in the burners.

Two firing units are used, and by an ingenious ar-

The two tracks shown are above and on either side of the granulator.



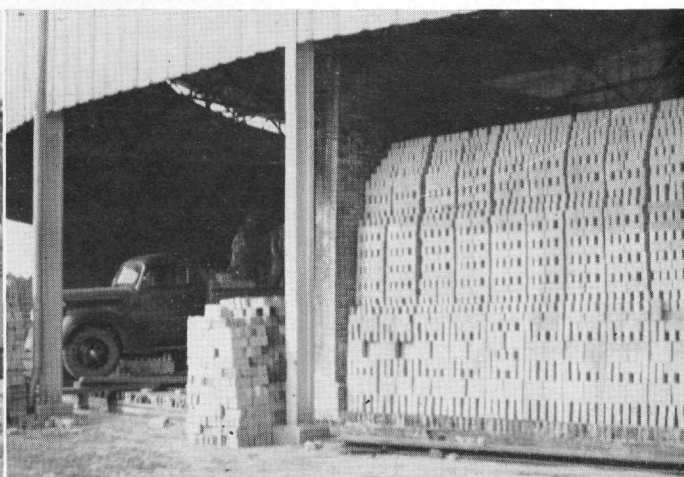
rangement of the flue system, hot combustion gases from the firing hood of unit number one are conducted into the main flue and then into the preheating chamber of number one, and the heat from cooling unit number two is used to dry the brick in the number one drying hood and vice versa. Thus the heat energy is utilized to the utmost and consequently fuel costs are low.

The steps in the cycle of drying and firing the ware are of a logical and coordinated procedure. In reference to the diagram, the conveyor (C) is directed towards kiln number four where the workmen receive the delivered brick and place them eleven courses high. When this is completed, the drying hood is pulled over from number five to number four, the flues are connected so that it receives the heat from the cooling unit of the other section. These bricks dry sufficiently while another section opposite receives eleven courses, then the drying hood is pulled off number four and the workmen again set another eleven courses in this kiln section which are dried there. The third day, the drying hood is again removed and the third and last eleven courses are set and dried. When this is complet-

ed, it is ready for preheating, and the preheating unit is moved from three to four, the firing unit from two to three, and the cooling unit from one to two. The connections are made, insulators inserted in their proper places, and both sections have each burned off another kiln, which happens every third day. The men now begin to lay brick in number five to be dried as well as in the directly opposite kilns. Fans are used to pull the heated combustion gases from the firing hood into the preheating hood from which the spent gases are allowed to escape into the atmosphere through a vent in the roof of the hood. The fans are mounted on trucks and can easily be moved from section to section after a kiln is burned off. Naturally, the fans operate at high temperatures, but they are constructed of heat resisting metal. Similarly, pyrometers are used to control and check temperatures and are installed in the top and bottom of each firing hood and in each fan.

One of the advantages of this plant is in its ease of supervision; for, with the clay house and machine room provided with a great deal of clear window glass, the foreman is able to regulate and control the plant opera-

Left: The gasoline shovel is loading pit cars. Right: The piled brick shows a setting in a fired kiln.



tion more easily. Extra kiln space was provided so that no second handling of the brick would occur, and trucks are able to back up to the kiln from which the brick is easily loaded onto the truck.

Although the movable hoods and machine room can be moved by the available man power, suitable machinery has been installed to accomplish this moving.

The capacity of this plant is 70,000 brick per day. The plant employs only fourteen men, thus the capacity per man is 5,000 brick per day or nearly twice that of other ceramic plants making brick under the ordinary methods of manufacture. It is even claimed that the amount of brick per man can be increased approximately one third by the addition of another firing unit.

The great advantages of this system consist of its accessibility, compactness, ease of supervision, simplicity, and the consequent savings in labor. All labor for hacking and handling brick in and out of the dryers is eliminated as well as the transportation of the brick to a storage shed.

Fortunately, with such a great boom in the building industry in nearly all cities, due to the federal housing

projects, the bricks are sold as fast as they are manufactured.

Of course, the plant has yet to pass its real test. This will be based on its life and the frequency of repairs necessary. It is obvious that with such great weights being supported by wheels and revolving on tracks, that strains will result and wear will be great. However, it was stated by Mr. Garve, the designer, at a recent meeting that the wear and strain would be great in the revolving parts if a great velocity were used; however, since these movements are carried on at low velocities, the resulting effects are expected to be small.

In any event, the Washington Brick Company demonstrates its confidence in the soundness of the theory, by already working out plans for the adaption of this system of manufacturing to the production of large drain tile, flue lining, and sewer pipe.

Thus the brick industry seems to be headed for streamlining and modernization, with the "Circle System" off to a flying start.

Note: The cuts in this article are used through the courtesy of "Brick and Clay Record".